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ABSTRACT

This study describes a method for providing easily understood information on the comparative instructional program effects of using multiple instructional products. The method was derived in the context of a national evaluation of three instructional product systems each of which was used to teach readiness and initial reading skills to kindergarten students. Longitudinal data were gathered from 900 classes, with each class using one of the products. The results illustrate how valid information on instructional effects can be obtained and used for the purpose of comparative evaluation. Further, the results contradict the popular belief that the specific instructional resources used in an instructional program do not matter. Instructional outcomes reflect the specific skills and concepts emphasized in a given product system, and these differences in emphasis emerge when instructionally sensitive instrumentation is used. Of more importance, the study illustrates a methodology that can be used for what is referred to as empirical curriculum inquiry. This is a way of identifying what students know, what school programs commonly and uniquely teach, and what students learn. Some implications of this methodology for school improvement efforts are discussed. (Author/BS)

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PROGRAM-FAIR EDUCATIONAL EVALUATION AND EMPIRICAL CURRICULUM INQUIRY

Ralph A. Hanson and Jerry D. Bailey

ABSTRACT

Obtaining an understandable description of what is being accomplished in a school program is an extremely difficult task using available methods. Even more difficult is obtaining comparative information on program effects when multiple instructional products are being used. This study describes a method for providing easily understood information on such comparative instructional effects. The method was derived in the context of a national evaluation of three instructional product systems each of which was used to teach readiness and initial reading skills to kindergarten students. Longitudinal data were gathered from 900 classes, with each class using one of the products. The results illustrate how valid information on instructional effects can be obtained and used for the purpose of comparative evaluation. Further, the results contradict the popular belief that the specific instructional resources used in an instructional program does not matter. Instructional outcomes reflect the specific skills and concepts emphasized in a given product system, and these differences in emphasis emerge when instructionally sensitive instrumentation is used. Of more importance, the study illustrates a methodology that can be used for what is referred to as empirical curriculum inquiry. This is a way of identifying what students know, what school programs commonly and uniquely teach, and what students learn. Some implications of this methodology for school improvement efforts are discussed.

PROGRAM-FAIR EDUCATIONAL EVALUATION AND EMPIRICAL CURRICULUM INQUIRY

Ralph A. Hanson and Jerry D. Bailey

Accurate descriptive information on the effects of instructional products designed to fulfill the same or similar educational program requirements has often been sought but rarely obtained in practice. In spite of the use of a variety of methodologies and instrumentation, the bottom line always seems to be the same; no specific effects of comparable instructional products can be detected. These results have led some researchers to conclude that such differences simply do not exist, i.e., the instructional resources employed in educational programs play a minor role, if any, in terms of measureable schooling effects.

As with many other broad conclusions about schooling effects, this one has not met with universal acceptance. Like the proposition that schools have "no effect," it lacks credibility on a common sense basis. Consequently, when an opportunity to examine the proposition arose in the context of fulfilling other research requirements, we pursued it.

The opportunity arose when the U.S. Office of Education initiated a project under Title III of the Elementary and Secondary Education Act. The project provided support for the purchase by schools of certain instructional product systems to be used in their kindergarten reading readiness programs during the 1973-74 school year. The acceptance of Title III funds obligated participating districts to provide USOE with program evaluation data. For those districts willing to participate in the study, SWRL agreed to provide instrumentation and other logistical support to fulfill the USOE evaluation requirement. The majority of the districts receiving funds chose this option.

Consistent with these conditions, the inquiry began with the limited objective of providing an operational methodology to measure the instructional effects obtained with the use of the alternative products in the kindergarten reading readiness instruction. The general approach was to obtain assessment results and other information from districts on the competing products of interest. Such data can readily be used to generate the reports required to fulfill the Title III evaluation requirement for each district (see Hanson, Schutz, & Bailey, 1977).

The data also can be used for the conduct of research on program fair evaluation issues if two related issues are addressed. The first is whether measures of reading readiness proficiency obtained at the end of the school year can be linked to measures of pupil status obtained prior to instruction and implementation measures obtained during instruction for samples of classes using each of the products. Several prior SWRL inquiries indicate this is possible at least with certain products and under certain conditions (Hanson & Schutz, 1978; Hanson, Bailey, & Molina, 1980). If it is possible in this context, it was reasoned that such results would allow us to estimate both the instructional sensitivity and magnitude of outcome proficiencies attained by users of each product. Put another way, these two kinds of information would indicate what instructional outcomes were yielded using a product and how well pupils learned what was taught.

Given that reasonable associations could be obtained between the operational use of a product and proficiency on its own outcomes, the second "program fair" issue could be addressed. Stated as a question, it asks, "Can the instructional sensitivity and magnitude of effects of an

instructional product be detected on outcomes not referenced to that product?" This is the central issue in program-fair evaluation; to describe the impact of several alternative products on the full range of outcomes that the products collectively address based on data from representative and comparable users.

DESIGN AND PROCEDURES

With agreement on several specific tasks and these general research goals, the KRR inquiry was launched. Districts in six states, using the four most popular kindergarten text series were designated as the inquiry population. Each of these districts was receiving funds for the purchase of one of the following: 1) Alpha Time (A), published by New Dimensions; 2) Beginning to Read, Write and Listen (B), published by Lippincott; 3) Distar I Reading (D), published by SRA; 4) The Kindergarten Program (K), published by Ginn.

Districts choosing to participate would receive all achievement tests and related instrumentation; summary reports on achievement performance for pupils, classes, schools, and districts; and fulfillment of the Title III grant evaluation requirement. SWRL would be responsible for instrument development; design and operation of an information system to distribute, receive, process, and report information to various audiences; and analyses of the data base for a series of R&D reports.[1]

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[1]This is the second major report in this series. An earlier report (Hanson, Schutz, & Bailey, 1977), provides considerable information about the inquiry design, materials and procedures and a descriptive summary of the data base. That information is summarized below to the extent necessary to make this document coherent and stand-alone.

Design and Instrumentation Considerations

The requirements of the evaluation sponsors, operational constraints on schools, limitations of time and resources, the general goals of the inquiry and other factors all had an influence on the formulation of the study design. While identifying all such factors and tracing their linkage to each of the design decisions is probably impossible, some of this conceptualization should be noted.

One important consideration was that the inquiry had to be carried out in ongoing school settings. This meant that the actual use of the instructional products would be fully under the control of the schools using them. While this was desirable in the sense that product use and effects could be expected to reflect typical rather than forced patterns, it did necessitate consideration of variability in product implementation.

To describe product implementation in each class, an Instructional Information Sheet (IIS) was prepared referenced to each product. The sheet included a common set of items about instructional time and emphasis given to various reading readiness topics and a set of questions about use of specific product instructional resources. In this study, only the information from the latter on the extent of product instructional resource use are involved.

Another important design consideration is that all participants chose both the reading readiness product to use and whether to take part in the study. These factors negated any possibility of either equating product user groups in advance or even assuming that the full range of

kindergarten pupil entry behavior were represented in each product user groups. To take such differences into account two approaches were used. The first was to measure certain characteristics of pupils and schools prior to the start of the program. The Entry Survey, a common test of reading readiness consisting of 22 individually administered items covering basic semantic skills (Coker & Legum, 1972; 1974) was used for this purpose. Teachers in each class were asked to administer this test to pupils on an individual basis prior to the start of instruction.

The second was to measure a set of biosocial variables derived from the School Information Sheet (SIS). It provides information on characteristics such as income level, ESEA Title I eligibility, ethnic-racial background, etc., on the pupils attending each school.

Another design consideration was the primary unit of analysis to be used in planning and analyzing the inquiry data base. Both the nature of the schooling process, particularly in the early elementary grades, and earlier SWRL research on instructional product implementation suggested the classroom as the primary unit of analysis (Wiley & Bock, 1968; Hanson & Schutz, 1978). Briefly, the rationale for this choice is that in the actual delivery of instruction in an elementary school program such as kindergarten reading readiness, the primary source of variance in implementation is at the class level. Decisions made at the class level regarding scheduling of instructional activities, the materials and procedures to be used, configurations of instructional groups, etc., tend to be by far the most direct and significant implementation elements and have been found to relate directly to instructional product proficiency.

Further, while these classrooms' implementation behaviors reflect in part the policies and practices of the schools and districts in which they operate, they tend to be most directly affected by specific classroom factors.

Another design factor of importance is the provisions for measuring pupil proficiency at the end of the school year. Prior conceptual work on measuring the instructional effects of alternative products (i.e., Wolf, 1968; Popham, 1969; Majer & Sullivan, 1970; Shoemaker, 1972) all suggested that some or all or the following steps to be taken in preparing program-fair tests.

- Obtain behavioral objectives for each product to be evaluated.
- Analyze the composite set of objectives from all products to identify the common and unique objectives for each product.
- Develop measures of each common and unique objective.
- Generate items to measure each outcome and administer them in classes using each of the products to be evaluated.

This general strategy departed from prevailing comparative assessment practices in recognizing that the effects of one instructional product may or may not be reflected on a single, common measure such as a standardized achievement test. However, it provided no guidance for resolving the issue of how to determine common and unique objectives for a given set of educational products. Rather than ignoring this issue or assuming that the common and unique objectives could be identified on an analytical basis alone, a way of empirically identifying the common and unique effects of a product was sought.

The measurement strategy adopted was to generate test items referenced directly to the product's instructional resources. Operationally, this task was accomplished through detailed analytical work on the instructional materials and procedures. These analyses were carried out separately on each product and resulted in tables that list each concept or skill presented, the format used to present instruction on it, and some indication of the amount it would be practiced under typical use.

From these specifications, prototype items referenced to each concept or skill resulted. These prototype items organized under the published outcome descriptions which accompanied each product were then reviewed by the product's publisher for additions and deletions. After incorporating the publisher's comments, the full item pool was completed. It was designed to include items reflecting each format used in instruction and most, if not all, of the specific elements taught.

The final lists of outcome areas are reproduced in Appendix A. For each product outcome a brief definition and the number of items generated under the area is indicated and an instructional area number is given. The latter refers to one of a set of 12 broader instructional areas under which the outcomes of all four products were further organized. Each instructional area is defined in Figure 1 and the specific outcomes of each of the four instructional products which fall under it are indicated.

Note that for some instructional areas all the products are represented by one or more outcomes, while under other instructional

areas as few as one outcome and product appear. These reflect broad differences in instructional emphasis between products. Examination of the specific entries in this figure provides preliminary comparative information on these differences in emphasis without referring to the relative effectiveness of the products in affecting learning in the area.

Insert Figure 1 about here

Assessment Development

The item pools described in Appendix A were used as the elements for building three long (maxi) and three short (mini) test forms referenced to each product. Each maxi (or long form) was designed to test all outcomes of the product. Taken together, the three maxi forms exhausted the item pool for the product. The mini forms were designed to measure only the major outcomes of a product. They typically included about one-half as many items as the maxi forms. Taken together, however, the three mini forms covered all major outcomes of a product. They did not, however, exhaust all items in all the pools.

The mini and maxi test forms were combined for administration. Thus, each class received a test composed of two parts; a maxi form referenced to the product being used in the class and a mini form referenced to one of the other comparison products. This assessment design is a modified matrix sampling approach in which the mini forms

from comparison products are distributed across the users of each product.[2]

Participation

The flow of study instrumentation went from SWRL through a coordinator, designated by each district, to classrooms and then back through the coordinator to SWRL. This arrangement had several advantages. It allowed the pupil and teacher sources of information to remain anonymous outside the district. The coordinator assigned and maintained a class numbering system within the district. Within classes, the teacher maintained a pupil numbering system. In addition to monitoring the receipt and return of materials, the coordinator also provided support and assistance where needed in the completion of materials and interpretation of results.

The data on participation, measured in terms of data components completed, indicate that district coordination and support were excellent in this inquiry. Over 1,000 classes, representing about 60% of the eligible districts in the six states, i.e., those receiving Title III funding for one of the four applicable products, actually participated in the inquiry. These districts were enrolled in response to only a single general letter of invitation. Even more impressive is that these participants completed and returned over 95% of the data collection

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[2]The earlier report (Hanson, Schutz, & Bailey, 1977) describes these test development and procedural aspects in more detail. See Hanson, Behr, Meguro, and Bailey (1981) for a complete description of the test development procedure. Actual tests and other instrumentation used in the study are described and reproduced in Bailey and Hanson (1978).

instruments delivered to them. The actual number of pupils, classes, schools, and districts returning each study component is given in Table 1.

Insert Table 1 about here

Note that the level of participation for one product, Distar 1, was limited to about 650 pupils from one state. By way of comparison, the participation levels for the other three products were substantially larger and representative with over 6,500 pupils from six or seven states using each of them.

Because of the small number of Distar 1 users and the rather large sample sizes required by the inquiry design, it was decided at the outset of the inquiry not to include them as a product use group. Thus, the assessments distributed to them did not include items referenced to the three other products and their data were used only to fulfill the Title III evaluation requirements. However, the assessments distributed to the other three product groups did include items referenced to Distar outcomes. Thus, the data base that resulted included information from three groups of product users on items and outcomes referenced to each of them as well as to a fourth set of items referenced to Distar 1.

PREVIOUSLY REPORTED FINDINGS ON THE EFFECTS OF EACH PRODUCT

The initial focus in analyzing the KRR study data was on fulfilling the Title III evaluation requirements within the project time constraints. Given the extensive assessment data plus the supplementary

information on pupil entry status and product implementation, the required Title III results were easily generated. These results took the form of district level reports and state and national level aggregates of these results by each of the four products. The primary concern in those reports was describing pupil proficiency (average percentage of items correct) after instruction on the outcomes referenced to the product in use in a district.[3]

Following the generation and distribution of these user reports, the first technical report was completed (Hanson, Schutz, & Bailey, 1977). Included within it were a number of analyses and findings which bear on the comparative evaluation of the products. These are summarized below:

- Descriptions of study participants in terms of biosocial characteristics such as ethnic background, average family income and status on national reading norms showed that each of the three product user groups included schools representing each of the characteristics categories. Further, there appeared to be no major imbalances in the distributions on these characteristics across the three user groups. Put another way, using these characteristics alone for the three user groups, one would not be able to predict differential achievement or schooling advantage for any one group.

- The rough comparability of the three product user groups observed on the biosocial characteristics were further confirmed by the Entry Survey test score distributions. The distributions of class means on this measure were similar but not identical for the three groups. The highest grand mean was attained by the Alpha Time users followed by the Kindergarten users and then the Beginning users.

- Product implementation estimates obtained from teachers in terms of the number of lessons or units a class completed did show some differences across products. For the Alpha Time users, nearly

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[3]Detailed accounts of the actual report generation process, including an illustrative district report are given in Hanson, Schutz, and Bailey (1977).

70% of the classes were in the highest quartile of product use as compared to 33% and 38% for the Beginning and Kindergarten product users, respectively.

- The proficiency level of classes using each product on outcomes referenced to that product varied. However, high overall proficiency levels were obtained on the majority of the outcomes, although there were some notable differences. One of these is in the percentage of product outcomes at the low and moderate levels of proficiency. For Alpha Time and Kindergarten user groups there were 3 and 1 outcomes, respectively, showing an average proficiency level of less than 60%. This compares to 15 outcomes below that level for Beginning users.

- An initial effort at establishing the instructional sensitivity of outcomes was achieved by linking outcome proficiency to implementation categories for each of the three product user groups. The average proficiency levels attained on each outcome by classes in each of four implementation quartiles was reported. The expectation was that classes implementing more of a product should attain higher proficiency levels. These analyses showed this linkage could be found for some outcomes but not others. Overall, 27 of the 61 outcomes (44%) showed patterns of increasing proficiency with more implementation. While these outcomes were not equally distributed across products, there were some outcomes that showed instructional sensitivity across each of the three product user groups.

The initial KRR report ended at this point on a promising but as yet unconfirmed course toward a methodology for comparative product evaluation. It had served to nicely fulfill the Title III evaluation requirement in a useful way for both the districts and the government sponsors. Also, it did provide some evidence that the three groups of product users were roughly comparable in terms of baseline characteristics. Finally, it did indicate that some linkage exists between the implementation and proficiency measures, at least within products. As indicated previously, such linkage was considered as essential element in a methodology for a program-fair evaluation.

What remained to be accomplished was the development and application of a strategy for providing comparative information on instructional effects. As indicated previously, such a strategy would ideally provide information for each product on both the instructional sensitivity and proficiency level attained on items and outcomes referenced to it and the other products.

DESCRIBING AND COMPARING THE INSTRUCTIONAL EFFECTS OF COMPETING PRODUCTS

To address the issue of comparative product effects, the first step was to formulate a strategy for analyzing the extensive proficiency information. The strategy centers around the three major inquiry variables; entry proficiency, instructional implementation, and post-instruction proficiency. Data on these three variables were derived from each participating class using the instrumentation described previously. These data were used as input to a 2x3 matrix (see Figure 2). The two dimensions of this matrix correspond, respectively, to instructional sensitivity (2 categories) and proficiency level (3 categories). It was used to classify each item and outcome for each product-user group into one of the 6 categories which result from crossing these dimensions.

Insert Figure 2 about here

To accomplish this classification, rules for determining inclusion in each category were derived. For the two instructional sensitivity levels, a commonality analysis was used (see Figure 3). In this analysis, the independent variables of entry survey mean score and amount of instruction completed were regressed on the dependent variable,

average item proficiency. The actual computations were carried out stepwise, using both orders of independent variables. The results provide a breakout of the portion of variance related to each of the independent variables alone as well as shared. The rationale behind this analysis is that for classes there should be a relationship between instructional implementation and proficiency after adjusting for any differences prior to instruction. The component of the commonality analysis which represent this variable is e in Figure 3, the portion of proficiency variance shared exclusively with the instruction completed variable.

Insert Figure 3 about here

The actual results showed that this variance component (e in Figure 3) accounted for between 0 and 51 percent of the variance across all items. For reasons to be discussed later, a relatively low percentage value of 10% was chosen as a cutoff value for designating an item as sensitive. This means if more than 10 percent of the variance of item proficiency was shared exclusively with the instruction completed variable, the item was considered to be instructionally sensitive.

By choosing a low value, the strategy was to maximize the number of items being designated as sensitive. The reason for doing so is twofold. First, the quality of the variable measuring product use as a general measure of product implementation was not known. Second, the impact of curtailed item proficiency variance is known to be substantial. The restricted variance would be expected to depress the proficiency

implementation correlation in the commonality analysis. Under these circumstances, a conservative criterion for inclusion was considered most appropriate.

Forming the three proficiency categories in the decision matrix was straightforward. Item proficiency was determined by using the post-instruction item difficulties corrected for guessing, and forming a three category variable. The lowest category corresponds to chance plus 10% and the upper, 70% plus chance. All proficiencies falling between are referred to as in the "some proficiency" category.

Illustrative Item Analyses

The classification scheme was applied independently to data on each study item from the three product-user groups. The form of these analyses is illustrated in Table 2. This table presents the average item proficiency and the commonality estimate associated with implementation-proficiency variables for each of the three product user groups on four different items, i.e., a total of 12 separate analyses. Using the proficiency level and commonality value, each item is assigned to a category (1 to 6) for each user group. The 12 analyses reported here as well as the others carried out in this inquiry were based on data from at least 200 classes.

Insert Table 2 about here

Similar analyses were derived for the 278 items on which each of the three product-user groups provided data. This resulted in a total of 834 individual analyses, i.e., three product-user groups by 278 items. These

Item level data form the primary source of information for this report. They are examined within and across several levels of aggregation, i.e., products, product-user groups, outcomes and instructional areas, and interpreted both in terms of their relevance to program-fair evaluation issues and to the more general issues of empirical curriculum inquiry.

Item Level Summaries

Using the full set of item classifications, overall summaries were derived for each product user group by product referenced. These data are given in Table 3. They show some interesting differences both across products and user groups. Considering the products first, the results show A items were most frequently placed in the high proficiency categories. Fully 89% of the classification were in either category 1 or 4, both reflecting high proficiency. This figure compares to 29% for B items, 37% for K items, and 27% for D items. This suggests that the A items were either considerably easier or were learned by the vast majority of pupils in the study.

Insert Table 3 about here

A related result is the rather small proportion of the A items which fall into the sensitive half of the table, i.e., categories 1, 2, and 3. Only 16% of the A item classifications were in these categories. This compares to 35%, 61%, and 41% for the B, K, and D item sets, respectively. Somewhat surprisingly, the D items were found to be sensitive more frequently than either the A or B items. This would suggest that A items were easier rather than learned.

Overall, the data show items were classified in the sensitive categories, i.e., 1, 2, and 3, only about 1/3 of the time. This may reflect either an actual discrepancy between what is included in the product instructional resources which were used to generate the item pools and what is taught, or it may reflect technical problems such as insensitivity in the measure of implementation used and/or high item difficulty levels producing little item variance. Both of these factors might impact on the commonality analyses used to form this classification.

To hedge against these possibilities, an effort was made to include any item in the sensitive categories that showed a relationship between product use and average proficiency level. This was the justification, referred to previously, for using the value of 10% as the cutoff for the commonality value for inclusion of an item in the "taught" category.

A summary of the item level data by user groups is given in Table 4. These data show the results for the B and K user groups to be remarkably similar in terms of the percentages of all items assigned to each of the six classification categories. The largest difference between B and K users is in terms of sensitive items and is reflected in the 7% difference in category 2, favoring the B users, i.e., 27% versus 20%. This difference, however, is balanced out by the 5% difference in category 1, favoring K users, i.e., 13% versus 8%.

Insert Table 4 about here

By the way of contrast, the B and K users differ substantially from the A users in terms of the percentage of items classified within

categories. The most notable differences are in the large percentage of items classified in the not sensitive categories for A users and also in the large number in the low proficiency categories, i.e., 3 and 6. For A users, 36% of the items fall into these categories as compared to 19% for B users and 21% of K users. In conjunction with the previous set of results (Table 3), these data indicate that A users performed at substantially lower levels of proficiency than B and K users on items not referenced to their respective program. Also, there was little direct relationship between the levels of proficiency attained by A users and the amount of Alpha Time instruction received.

While these findings emerge very clearly, the data have several limitations. One is that they ignore differences between items in terms of the scope and importance of the instruction they reference; i.e., all items are weighted equally. An item which measures a relatively complex skill for any kindergarten pupil, such as reading a sentence, is treated as equal in importance to an item measuring an easier skill, such as knowledge of colors.

A second related limitation is the unequal numbers of items used to represent products, outcomes, and instructional areas. The number of items vary from 58 to 85 across the four products. Such differences in the number of items coupled with the fact that product users tend to score at higher levels on their own items, further complicates the interpretation of the item level summaries. Under such conditions, products which included larger numbers of outcomes and items would be at an advantage in all cases in such comparisons.

Outcome Level Summaries

To obtain further insight into product effects, classifications of the individual items referenced to an outcome were aggregated to obtain an outcome level classification. In carrying out this aggregation, several technical issues had to be considered.

One issue is the classification consistency of items falling under the same outcome. It would be ideal if all the item level analyses for an outcome and user group were assigned to the same classification category. This would make the outcome categorization match that of the items perfectly. In practice, this happens infrequently. The more typical result is for most items under an outcome to fall into the same category with those remaining dispersed in categories around it. With such data, the modal item category is probably the best basis for categorizing an outcome and was used in this analysis.

A second issue, similar to that noted for items, concerns the scope of instruction referenced by an outcome. Some outcomes represent a substantial segment of product instruction while others may simply be touched upon in instruction. To some extent such differences in emphasis and scope are reflected in the number of items included for an outcome. However, it is very difficult to take such differences into account. Thus, in the outcome level analyses to follow, each outcome is treated as "comparable." However, because the number of outcomes vary between products, i.e., from 10 to 25, and there is the aforementioned expectation that a user will fare better on outcomes referenced to the product in use rather than other products, there is an inherent bias in favor of the products with more outcomes, which should be kept in mind.

These factors considered, Table 5 presents the classification frequencies for outcomes by the product they reference for the three product user groups. There are different patterns for each set of product outcomes. The A outcomes almost all fell in category 4, i.e., not sensitive and high proficiency, for all three user groups. Only 11 of 60 outcome classifications were not in category 4, and seven of these fell in category 1. Both 4 and 1 reflect high proficiency levels confirming that all three user groups attained high levels of proficiency on nearly all A outcomes.

Insert Table 5 about here

Results on the B outcomes show the most variability in assignment to categories across user groups. The largest frequency was again in category 4, with 28 of the 72 classifications falling in it. However, there were also significant numbers of outcomes classified in each of the five other categories. In fact, with one exception, each of the three product user groups had at least one B outcome classified in each of the six categories.

One clearly distinct feature of B outcomes is the substantial number classified in the middle and low proficiency categories (i.e., 2, 3, 5 and 6). Over half of the outcomes were in these categories and were about equally distributed across each of the three user groups. B outcome classifications were quite similar for the three user groups in the not sensitive categories, i.e., 4, 5, and 6. However, consistent with earlier results, the A users show only 3 entries in the sensitive

categories. This compares to 11 outcomes in these categories for B users and 13 for K users.

Focusing only on proficiency level, the results across the three user groups look very similar on the B outcomes. B users as expected have a few more entries in the mid and upper proficiency categories, A users have a few less with the K users falling somewhere in between.

The results on the K outcomes is different but share some similarities with both the A and B results. Like the A outcomes, few K outcomes were classified in the sensitive categories. However, like the B outcomes, the results across the high, medium, and low proficiency categories for all user groups are nearly identical (after eliminating the instructional sensitivity distinction). Unlike B outcomes, which showed a substantial percentage of outcomes classified in the low categories (3 and 6) only 1 K outcome, out of a total of 33, was in a low proficiency category.

The results for D outcomes differ in one clearly expected way from those of the other products; there were few outcomes classified in the high proficiency categories. Since the D outcomes were not referenced to the instruction provided to the A, B, and K user groups, this is to be expected. In terms of both level of proficiency and instructional sensitivity the K users did slightly better than the B users, which did slightly better than the A users, on the D outcomes.

To summarize, the outcome level analysis showed substantial differences between the four products in terms of both sensitivity to

instruction and level of proficiency across. For A outcomes, low sensitivity and high proficiency was the dominant pattern. B outcomes showed the most varied results with substantial numbers classified in each of the six categories. K outcomes were mostly classified as not sensitive and in the medium and high proficiency categories. Finally, D outcomes fell mostly at the medium and low proficiency levels, and were about evenly divided between the sensitive and not sensitive categories.

Instructional Area Analysis

A summary analysis of the study data by instructional areas is presented in Table 6. It gives the number of outcomes and items from each product represented and their percentage of the total (in parenthesis below) for each instructional area. Also, a detailed look at the proficiency levels attained by various subgroups of items and users within each instructional area is given.

Insert Table 6 about here

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before proceeding to the proficiencies, it is of interest to examine the percentage of items and outcomes falling under each instructional area in the four kindergarten reading products. At both the item and outcome levels these data indicate the first six instructional areas of Word Meanings, Phonics, Word Reading, Sentence Reading, Oral Questions, and Letters subsume about 80% (76% and 83%, respectively) of the composite instruction for the four products. Further, these six areas and one other, Writing, are the "common" areas, i.e., those represented by

outcomes and items from two or more products. Given the emphasis on these six areas in the products, the focus for interpreting the data will be on them.

Within and across instructional areas, the proficiencies in Table 6 show differences between products. In interpreting these differences, it is helpful to have some kind of guideline. Because of the way the data were gathered, deriving a precise guideline for estimating statistical significance is difficult. Ideally, one would like to have some fixed value for a difference, e.g., 10% which would be the miminum difference to apply in all cases. Such a guideline is possible in this case only by making some simplifying assumptions.

Given that the minimum number of classes included in any user group estimate is at least 250, and totally ignoring the fact that each estimate is based on multiple items, confidence limits can be derived using standard formulas for percentages. These limits will be extremely conservative since nearly all proficiencies are based on multiple items and item/classes which usually number more than 250. Using the larger N's which would result from considering these two factors would certainly significantly reduce the size of the confidence limits.

Using 250 as the number of classes used to derive each percentage, a value of $\pm$ 5% is a reasonable confidence band. That is, a proficiency level exceeding another value by more or less than 5% can conservatively be considered to be a statistically significant difference. It also might be argued that such a difference would be the minimum value of practical significance to school personnel.

Turning to the data in Table 6, a clear distinction between results for the first six and last six instructional areas can be seen. Looking first at the last six instructional areas, only two outcome areas, Reading Questions (7) and Spelling (10) show any meaningful difference between user groups in overall proficiency. Reading Questions includes 15 items referenced to two D outcomes, and the average proficiencies of all user groups were low and varied little i.e., from 26% to 32%.

The Spelling area showed similar low proficiency levels. It included three B items and the proficiencies ranged from 8% to 22%. The large proficiency range was the result of the B users, as expected, scoring higher than the A and K groups, i.e., nonusers, on these items.

On the other four outcomes in this group, Affective Behavior (8), Writing (9), Psychomotor Skills (11) and Music Awareness (12), the average proficiency for all three groups is comparable--i.e., within three percentage points. Also, user and nonuser proficiencies are nearly the same and overall proficiency is quite high, i.e., from 70% to 93%.

Turning to the first six instructional areas, there is a great deal more to be said since each instructional area presents a somewhat different situation. Looking at Letters (6) first, the interpretation is quite simple and straightforward. All three product user groups contributed outcomes and items, and extremely high levels of proficiency (about 83%) were attained by all three product users on all item sets. Also user-nonuser differences are small for all item sets.

The results for the Oral Questions (5) area show another pattern. The overall proficiency level is moderate (in the 67% to 70% range) with

little variability between either the three product user groups or the user-nonuser groups.

The instructional areas of Word Reading (3) and Sentence Reading (4) show similar and important differences between all groups. For both these areas, items and outcomes referenced to the B, K and D products are included but not those of the A product. This absence of word and sentence reading items points to a major difference between Alpha Time and the other three products and is surely a major reason for the lower average proficiency attained by A users in these instructional areas.

For Word Reading (3), the proficiency differences across user groups within item sets ranged from 13% to 65% and for Sentence Reading (4) from 3% to 44%. There were also large overall user group differences, ranging from 30% to 41% for Word Reading (3) and 11% to 32% for Sentence Reading (4). There were also user-nonuser differences. Both B and K users tended to perform significantly better on their own Words and Sentences than on each other's and those referenced to Distar. Overall, K users attained the highest proficiency levels in both instructional areas with B users a close second on Word Reading (3) and a distant second on Sentence Reading (4). In both areas, A users were substantially lower than both of the other user groups.

Phonics (2) is an especially interesting area because it is the only instructional area which includes outcomes and items from all four products. In spite of the fact that all products contributed items, the proficiencies of the three user groups within item sets varied

substantially, i.e., from 47% to 67%. Overall, B and K user proficiencies were 59% while the A users proficiency level was significantly lower at 54%. User-nonuser differences ranged from 6% to 11%, showing substantial content/format differences in this area. Overall, the three user groups performed quite comparably on the large set of Distar outcomes and items in Phonics (3). The average proficiencies differed by only 2%, i.e., A (57%), B (58%), and K (59%).

The final and largest instructional area by far in terms of both outcomes and items is Word Meanings (1). One-third of the outcomes and one-fourth of the items are in this area. This is in spite of the fact that one product, Distar, contributed no items to Word Meanings (1). Of the three products represented, the B items were clearly substantially more difficult than those referenced to the A and K products. Average proficiency on the B items was around 50%, while on the A and K items proficiency was greater than 80% in all cases. An examination of the B items indicated that the discrepancy was probably due to the fact that some of the B items combine less common concepts with more difficult item formats.

In spite of these distinctions, B users did not attain substantially higher proficiency on B items. Generally speaking, there were relatively small differences between user groups on all item sets in this instructional area. Also, there were small differences between users and nonusers, i.e., 73% versus 71%, showing little product-specific impact.

A final summary of the instructional area data is presented in Table 7. In addition to the average proficiency attained by each product user

and the user-nonuser groups, it gives the average proficiencies attained by classes that completed all product activities. Thus, the Avg.-All columns estimate how proficiency would differ if the full set of product resources were utilized by all classes. Also included in the table (in parentheses below the proficiencies) is the percentage of items found to be instructionally sensitive. This table probably represents the best overall summary of both what constitutes kindergarten reading readiness instruction and the relative effects of the three products being compared.

Insert Table 7 about here

In terms of comparative product proficiency there is a clear ordering of the three products; Kindergarten Program is highest, followed fairly closely by Beginning to Read, Write and Listen, with Alpha Time a considerable way behind. Further, this ordering is not changed much by the extent of implementation of the products. Thus, the classes which completed all of Alpha Time actually improved <u>least</u> in proficiency when compared to the average completion group. For B and K users, the results of implementation were more clear cut. Both of the user groups showed substantial gains in most areas with greater implementation. In several areas such as Word Reading (3), and Sentence Reading (5), and Writing (9), B users gained more with full implementation than K users. However, in other areas such as Phonics (2) and Reading Questions (7), K users gained more.

But how significant are the actual differences registered between products in terms of overall effects on pupil learning? Clearly, this question varies with the instructional area being considered. If one uses the 5% average difference, K users produced a significant improvement over B users in the areas of Sentence Reading (4) and over A users in the areas of Phonics (2), Word Reading (3) and Sentence Reading (4).

By the same criteria, on the average, B users exceeded K users in the area of Spelling (10) and exceeded A users in the areas of Phonics (2), Word Reading (3), Sentence Reading (4) and Spelling (10). A users did not exceed the proficiency level attained by the other two user groups in any area.

It is of interest to note how closely the empirical results correspond with the earlier analytical specifications for the products in terms of outcomes and items. The two areas in which A users turned in the lowest relative proficiencies, i.e., Word Reading (3) and Sentence Reading (4), are areas in which the product was not represented by outcomes and items. Likewise, the single highest relative proficiency of B users was attained in the Spelling (10) area, one in which only it provided instruction.

This same kind of result did not hold, however, for A users in the Affective Behaviors, (8) and Psychomotor (11) areas. In spite of being the only source of items in these areas, A users did not attain significantly higher proficiency levels than the other user groups.

The instructional sensitivity percentages provide another dimension to the results in Table 7. As noted in previous analyses, these figures show the A user group to have many fewer sensitive items. Further, the table shows that this was especially true in the instructional areas of Word Reading (3) and Sentence Reading (4), where there were not any objectives referenced to Alpha Time. This is exactly opposite to the results for B and K users, which had their largest percentage of instructionally sensitive items in these areas. Overall, the latter two user groups had higher and basically comparable percentages of sensitive items. Variation in item sensitivity across instructional areas was quite substantial both within and across products.

If these percentages are viewed as indicators of the extent of instruction provided in a given area, they provide some interesting insights into kindergarten schooling effects. If only those areas are selected for which somewhere near 50% of the items were found to be sensitive, only three or four instructional areas emerge. These are Word Reading (45%), Sentence Reading (49%), and Reading Questions (53%). One other area, Phonics (37%), is close. Other heavily instructed areas such as Vocabulary, Teacher Questions and Letters show substantially lower percentages of sensitive items.

Interestingly enough, the areas in which highest percentages of sensitive items were found are also those in which substantial proficiency differences between product user groups were found. The convergence of these two kinds of information provides strong support for a simple but powerful proposition: products will only produce

differences in areas in which the school is providing substantial instruction. Based on this inquiry for the area of kindergarten reading readiness, these skills are primarily in the areas of Phonics, Word Reading, Sentence Reading and Reading Questions.

In the other areas which were heavily emphasized by the products--such as Vocabulary, Teacher Questions and Letters--higher levels of proficiency were attained uniformly by all user groups but fewer items were found to be instructionally sensitive. Perhaps such proficiency reflects general learning which occurs both in the Kindergarten classroom context and the overall environment of pupils. In any event there is little evidence that the products contribute differentially to learning in these areas.

A corollary to this proposition concerns the differential effects of products. The study data show clearly that differences between products will only emerge in areas in which schools provide instruction, and in which products differentially emphasize instruction. This corollary assumes, of course, that product implementation effort is comparable. As product implementation effort varies, effects vary directly and can serve to negate or even reverse expected differential effects of products.

IMPLICATIONS

The results of the inquiry have implications for a number of educational evaluation issues. These include the measurement of both educational product effects and implementation, two essential elements of any empirical program evaluation effort. Discussion of these elements provides background for the broader topic of evolving approaches to program evaluation and school improvement.

Measuring Educational Product Effects

The development of instrumentation for measuring product, product comparative, and program characteristics was a central feature of the inquiry. The findings support both prior and subsequent SWRL studies, i.e., Hanson and Schutz (1978), Hanson, Schutz, and Bailey (1981), Hanson, Bailey, and Molina (1981), Hanson, Behr, Meguro and Bailey (1980), and Hanson and McMorris (1983), in defining new directions for the development of product referenced measurement devices.

The essence of this methodology is the application of careful analytical methods to actual instructional resources of products rather than to their objectives. This analytical work provides specifications for the generation of prototype items which are then revised and validated through empirical inquiries. The central element in the empirical revision process is to link changes in measurement results to changes in instructional resource implementation. (Hanson, Behr, Meguro and Bailey, 1980).

This process yields a form of assessment instrument that differs both in form and substance from those usually employed in schools. The major difference in form is the reduction in the length (number of items) and scoring complexity (outcome scores). Separate scores need only be generated for broad but carefully defined instructional areas rather than each potential objective or outcome. Traditional program objectives and outcomes are viewed as logical precursors for program and product development efforts. However, at the point at which actual product resources are available, these are discarded in favor of the resources as

the basis for the test specifications. After empirical verification, a much shorter test, with fewer scores to interpret and composed entirely of instructionally sensitive items, is the result.

In single product as well as product-comparative inquiries, such instruments greatly reduce the time and effort devoted to development, distribution, and collection of product effects information while improving the integrity of the information provided. Assuming verified, product-specific instruments were available for each of the four KRR products, for example, each class could then have taken one, two or all three of the competing product tests in addition to the one referenced to the product in use, in the same amount of time as was spent using an item sampling approach. At the same time, interpretation would be greatly simplified since variability due to sampling is avoided.

It should be emphasized that much of the economics in testing time and effort envisioned here rest on some important findings concerning the various kinds of proficiencies students possess and those of interest for program evaluation purposes. The KRR inquiry sought to identify only those areas of proficiency that were of significant scope to warrant reporting and that could be verified as linked to the product or products in use. The results indicated that there are clearly both product-general and product-specific effects and that these effects can be best summarized in terms of six or seven instructional areas, as discussed earlier in Tables 6 and 7. All of the rhetoric associated with individual items and outcomes is not needed to summarize differences.

Given that the four products involved and the sample of districts, schools, and classes in the inquiry can be considered representative, the product-general effects can really be characterized as kindergarten reading program effects. Thus, program effects become defined operationally in terms of the major product-linked proficiencies displayed by students at the completion of a substantial schooling unit (semester or school year).

Beyond kindergarten reading readiness program effects other contributors to student reading readiness proficiency such as other school programs and activities in the home and community exist. While these sources and the broader domains of proficiencies on which they impact have not been addressed directly in this inquiry, the methodology would appear to generalize to them in a straightforward manner. In the language arts area, for example, the effects due to products in the program areas of reading, spelling, and writing could be examined simultaneously.

If put in schools on an operational basis, an important use of such effects information would be to monitor factors affecting them over time. Such a school information system, would include implementation measures in addition to the measures of the instructional area effects and could serve as the basis for meaningful school improvement efforts (Hanson, 1978). This issue will be discussed again later. The central point to be made here is that through use of this testing methodology, measures can be devised which are very sensitive to school program effects, yet short and efficient to administer and interpret.

Program and Product Implementation Measurement

Program implementation measurement is critical in understanding educational effects. In the KRR inquiry, implementation measures played a central role since they were the primary basis for determining the sensitivity of item, outcome, and instructional area measures for each product. Although the practice of measuring program implementation is not well developed, this inquiry as well as others, e.g., Hanson, Bailey, & Molina (1981), are providing some insights, especially as to the importance of product resource utilization as a central factor. Other related factors such as the amount of class time allocated, actually spent, and actually spent on instructional tasks, can be considered to be logical precursors of product resource utilization. However, sorting out the exact relationships between the various implementation factors and determining exactly how to utilize the information they provide is an interesting and challenging task still to be completed. The data sources, level at which implementation factors are measured, and the constraints on the instructional context all appear to affect the results.

In the KRR inquiry, the data source was teacher self-report, the level was the classroom, and the instructional context was program and product-specific. Other researchers have measured other implementation factors, e.g., allocated and engaged instructional time, at other levels, e.g., district, school, pupil, with other methods, e.g., direct observations, teacher logs, and in other instructional contexts, e.g., program-specific, curriculum area specific. All provide different

perspectives on the implementation process and uses of information about it.

In KRR, implementation information was used to link up directly to measures of pupil achievement; the implementation variable was considered a major independent variable. In other inquiries, implementation variables have been evaluated alone and even treated as a dependent variable. A most promising future arrangement would be the treatment of product utilization as the major operational link to monitoring and improving program effects in school improvement efforts. The variable allocated product time could be used as the basis for altering utilization.

To summarize, the role of implementation measurement in research and improvement is promising, but still emerging. KRR and related SWRL product inquiries illustrate how it can serve as the major independent and operational variable of interest for both research on and improvement of the schooling process. As such, it provides the basis for both validating program effects and defining patterns of product use for a variety of audiences.

An Evolving Approach to Program Evaluation

The KRR inquiry, in spite of its limited scope, illustrates an emerging operational approach to educational evaluation. The focus of this approach is simple: to identify and explicate the effects, practices and costs of educational programs for the purpose of understanding and improving them. While this kind of rhetoric is common in education, applications at a large enough level to demonstrate the veracity of proposed methods are rare.

KRR showed clearly that methods for describing the direct effects of instructional products and school programs exist. Further, these methods point to at least some of the implementation practices behind the effects.

Given measures of these two key elements and the operational context for deriving information on them, the requirements for obtaining meaningful cost information is also in place. Data on the instructional, personnel, and other resources expended, for example, can be readily derived for a product (Hanson, 1983). Other fixed cost components such as the facility are available and can be either prorated or ignored depending on the kinds of cost information desired. With data on costs, implementation factors and effects, very simple models linking the three sets of factors to each other should be possible. The utility of these models for enhancing improvement, program selection and program development efforts would, of course, depend on the strength of relationships that emerge.

Using the results from KRR provides an illustration of the kind of models sought and information they could provide. For the B and K products, there was substantial variability in implementation which was linked to effects, i.e., the greater amount of product implementation as measured by variables such as instructional time spent and resources used, the greater the level of end-of-year proficiency. Given cost figures could be derived for different implementation levels, some useful options could be described, e.g., a simple cross tabular array which shows the costs associated with several levels of implementation, and

several levels of effects. Such figures would provide the basis for a simple and meaningful description of programs in terms of the differential costs and effects of using alternative products. These data in conjunction with other information sources about the products should put educational product selection, program development process and school improvement efforts on a more informed basis.

As the enterprise of school, program, and product evaluation moves beyond textbooks and standardized testing, the possibilities for program planning and school improvement will become reality. The combination of careful analytical and empirical analyses on the instructional products used in various programs and factors influencing their implementation represents a promising means for achieving this advance.

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Instructional Areas and Definitions	Product Outcomes				
	Alpha Time	Beginning	Kindergarten	Distar	Total
1. Word Meanings--Selects illustrations/pictures corresponding to the meaning of spoken words and concepts.	2,3,5,10	2,4,8,11, 12,13,14, 17,21,23	1,2,3,4,5 6,7	--	21
2. Phonics--Selects word part corresponding to spoken sounds.	13	7,9,15	9	1,3,4,6	9
3. Word Reading--Reads aloud printed words presented alone or in sentences.	--	10,25	8	7,8	5
4. Sentence Reading--Reads aloud printed sentences.	--	26	10	--	2
5. Oral Questions--Answers questions aloud about concepts, topics, stories, etc.	6,7,9	20,22,24, 29	--	10	8
6. Letter Identification--Identifies letters in a variety of contexts.	1,12	6	11	--	4
7. Reading Questions--Reads a short passage and selects illustrations/words which answer questions about it.	--	--	--	9,11	2
8. Affective Behaviors--Displays affect in various specified classroom contexts.	8,11,15,16, 17,18,19, 20,21	--	--	--	9
9. Writing--Prints letters, words, and sentences.	14	16	--	5	3
10. Spelling--Selects correct spelling of simple words.	--	19	--	--	1
11. Psychomotor Skills--Displays physical coordination in specified classroom contexts.	--	27	--	--	1
12. Music Awareness--Selects appropriate musical instruments based on their sounds.	--	28	--	--	1

Figure 1. Description of instructional areas and a list of product outcomes within them.

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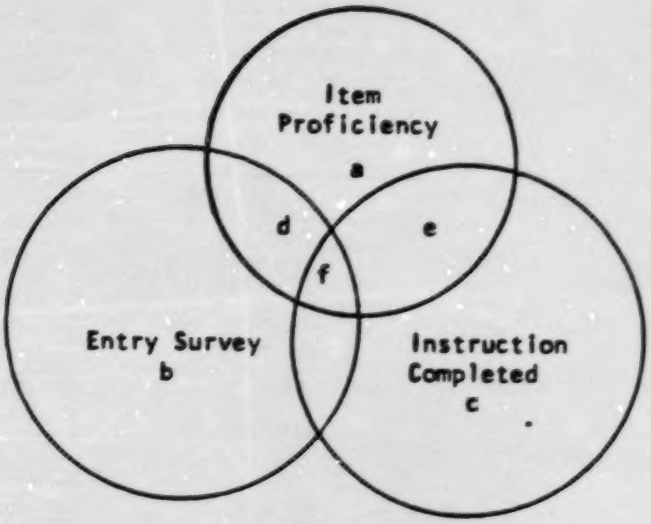
Average Proficiency Level After Instruction			
Sensitivity to Product Implementation	Low (Chance + 10%)	Medium (all between low and high)	High (70% + Chance)
Not Related (Commonality less than .10)	VI	V	IV
Related (Commonality more than .10)	III	II	I

Figure 2. Six category classification scheme. Commonality referred to is the portion of proficiency variance accounted for by instruction completed. (Corresponds to the quantity e in Figure 3.)



a	dependent variable-average item proficiency
b	independent variable-average entry survey score
c	independent variable-amount of instruction completed
d	portion of item proficiency variance shared exclusively with independent variable b
e	portion of item proficiency variance shared exclusively with independent variable c
f	portion of item proficiency variance shared by variables b and c
d+e+f	portion of item proficiency variance accounted for by variables b and c

Figure 3. Commonality analysis description carried out using class level data on each item for each of the three product-user groups.

Table 1

Number Returning Each Study Component

Program	Component	States	Districts	Schools	Classes	Pupils
Alpha Time (A)	Entry Survey	6	41	160	308	7603
	Instructional Information Sheet	6	41	137	244	----
	School Information Sheet	6	39	149	---	----
	Assessment	6	42	162	314	7309
Beginning to Read, Write and Listen (B)	Entry Survey	7	42	121	266	6809
	Instructional Information Sheet	7	43	116	235	----
	School Information Sheet	7	41	121	---	----
	Assessment	7	44	125	273	6697
Kindergarten Program (K)	Entry Survey	7	19	116	284	7358
	Instructional Information Sheet	7	19	105	248	----
	School Information Sheet	7	18	113	---	----
	Assessment	7	19	117	287	6141
Distar Program (D)	Entry Survey	1	5	19	23	654
	Instructional Information Sheet	1	3	14	16	---
	School Information Sheet	1	5	19	--	---
	Assessment	1	5	19	25	647
Totals	Entry Survey	7	107	416	881	22424
	Instructional Information Sheet	7	106	372	743	-----
	School Information Sheet	7	103	402	---	-----
	Assessment	7	110	423	899	20794

Table 2

Illustration of classification scheme applied to four actual items.

Item Description			User Groups								
			Alpha Time			Beginning			Kindergarten		
Example	Items	Product Reference	P	I	C	P	I	C	P	I	C
1	IS	(08) K 23	29	1	6	49	17	2	71	23	1
2	FAT	(11) B 27	24	10	6	33	21	3	39	41	3
3	SECOND	(05) A 21	64	0	5	59	2	5	76	5	4
4	Writing "I Have Fun"	(28) D 05	73	0	4	68	4	4	65	0	4

Legend
Product Reference-Item number is given in parentheses, the letter refers to one of the four products (A - Alpha Time, B - Beginning, D - Distar, K - Kindergarten) and the number indicates the product outcome referenced.
P - average item difficulty across classes in the user group
I - commonality estimate-percent of shared variance between class implementation and proficiency variables (see Figure 3)
C - Item classification category (1 to 6, see Figure 2)

Table 3

Summary of Item Classification (with row percentages)
by Product Referenced and User Group

Product Reference	User Group	Classification Categories					
		Sensitive			Not Sensitive		
Proficiency Level		High 1	Medium 2	Low 3	High 4	Medium 5	Low 6
Alpha Time (A)	A	0(0%)	0(0%)	0(0%)	50(86%)	7(12%)	1(2%)
(58 items)	B	11(19%)	4(7%)	0(0%)	42(72%)	1(2%)	0(0%)
	K	9(16%)	1(2%)	1(2%)	43(74%)	3(5%)	1(2%)
Beginning (B)	A	3(4%)	7(8%)	3(4%)	20(24%)	13(15%)	39(46%)
(85 items)	B	2(2%)	32(38%)	9(11%)	25(29%)	10(12%)	7(8%)
	K	9(11%)	14(16%)	11(13%)	17(20%)	12(14%)	22(26%)
Kindergarten (K)	A	3(5%)	1(2%)	2(3%)	15(25%)	22(37%)	17(28%)
(60 items)	B	3(5%)	18(30%)	2(3%)	16(27%)	13(22%)	8(13%)
	K	11(18%)	21(35%)	0(0%)	20(33%)	8(13%)	0(0%)
Distar (D)	A	3(4%)	3(4%)	1(1%)	15(29%)	19(25%)	34(45%)
(75 items)	B	6(8%)	20(27%)	20(27%)	14(19%)	7(9%)	8(11%)
	K	7(9%)	19(25%)	13(17%)	16(21%)	9(12%)	11(15%)
Totals (834 items)		67(8%)	140(17%)	62(7%)	293(35%)	124(15%)	148(18%)

Table 4

Number and Percent of All Items
classified in the six categories by user groups

Instructional Sensitivity	User Groups	Proficiency Level			
		High	Med	Low	Totals
Sensitive	A	9(3%)	11(4%)	6(2%)	26
	B	22(8%)	74(27%)	31(12%)	127
	K	36(13%)	55(20%)	25(9%)	116
	T	67	140	62	269 *
Not Sensitive	A	100(18%)	61(11%)	91(16%)	252
	B	97(17%)	31(5%)	23(4%)	151
	K	96(17%)	32(6%)	34(6%)	162
	T	293	124	148	565 *
Totals	A	109(13%)	72(9%)	97(12%)	278
	B	119(14%)	105(13%)	54(6%)	278
	K	132(16%)	87(10%)	59(7%)	278
	T	360	264	210	834*

*Percentages in each section based on the N in box [ ].

Table 5

Outcome categorizations by product and user groups

Product	User Group	Sensitive			Not Sensitive			Totals
		High	Med	Low	High	Med	Low	
	Categories	1	2	3	4	5	6	
Alpha Time	A	0	0	0	17	3	0	20
	B	1	2	0	17	0	0	20
	K	3	0	0	16	1	0	20
	Totals	4	2	0	50	4	0	60
Beginning	A	1	2	0	10	3	9	25
	B	1	9	1	11	2	1	25
	K	4	5	4	7	1	4	25
	Totals	6	16	5	28	6	14	75
Kindergarten	A	0	0	0	5	5	1	11
	B	0	4	0	5	2	0	11
	K	0	3	0	5	3	0	11
	Totals	0	7	0	15	10	1	33
Distar	A	0	0	0	3	1	6	10
	B	0	2	4	3	0	0	10
	K	0	5	2	3	0	1	10
	Totals	0	7	6	9	1	7	30
Grand Total		10	32	11	102	21	22	198
			53			145		

Table 6

Average proficiencies of the three product user groups (A, B & K) and user-nonuser groups (U, NU) on item sets for Alpha Time (a), Beginning (b), Kindergarten (k), Distar (d), and the total (T). Also gives the number of Items (I) and outcomes (O) referenced to each product within the instructional area.

1. Word Meanings

P	O	I	A	B	K	U	NU
a	4	21	86	86	87	86	87
b	10	24	47	52	52	52	49
k	7	21	81	82	85	85	82
d	--	--	--	--	--	--	--
T	21 (32%)	66 (24%)	70	72	74	73	71

2. Phonics

P	O	I	A	B	K	U	NU
a	1	6	56	67	58	56	62
b	3	13	47	57	55	57	51
k	1	6	53	61	66	68	57
d	4	33	57	58	59	--	58
T	9 (14%)	58 (21%)	54	59	59	59	57

3. Word Reading

P	O	I	A	B	K	U	NU
a	--	--	--	--	--	--	--
b	2	12	13	30	23	30	18
k	1	15	42	49	65	65	46
d	2	18	31	34	34	--	33
T	5 (8%)	45 (16%)	30	38	41	49	33

4. Sentence Reading

P	O	I	A	B	K	U	NU
a	--	--	--	--	--	--	--
b	1	9	3	21	9	21	6
k	1	12	6	18	44	44	12
d	1	6	30	34	42	--	35
T	3 (5%)	27 (10%)	11	22	32	34	17

5. Oral Questions

P	O	I	A	B	K	U	NU
a	3	5	70	68	69	70	69
b	4	12	65	69	66	69	66
k	--	--	--	--	--	--	--
d	--	--	--	--	--	--	--
T	7 (11%)	17 (6%)	67	69	67	69	66

6. Letters

P	O	I	A	B	K	U	NU
a	2	6	84	84	86	84	85
b	1	5	82	85	81	85	82
k	1	6	83	79	83	83	81
d	--	--	--	--	--	--	--
T	4 (6%)	17 (6%)	83	83	84	84	83

Table 6 (continued)

7. Reading Questions

P	O	I	A	B	K	U	NU
a	--	--	--	--	--	--	--
b	--	--	--	--	--	--	--
k	--	--	--	--	--	--	--
d	2	15	26	29	32	--	29
T	2 (3%)	15 (5%)	26	29	32	--	29

8. Affective Behavior

P	O	I	A	B	K	U	NU
a	9	14	74	73	73	74	73
b	--	--	--	--	--	--	--
k	--	--	--	--	--	--	--
d	--	--	--	--	--	--	--
T	9 (14%)	14 (5%)	74	73	73	74	73

9. Writing

P	O	I	A	B	K	U	NU
a	1	6	79	79	80	79	79
b	1	3	56	52	57	52	56
k	--	--	--	--	--	--	--
d	1	3	65	64	66	--	65
T	3 (5%)	12 (4%)	69	68	71	70	69

10. Spelling

P	O	I	A	B	K	U	NU
a	--	--	--	--	--	--	--
b	1	3	8	22	11	22	9
k	--	--	--	--	--	--	--
d	--	--	--	--	--	--	--
T	1 (2%)	3 (1%)	8	22	11	22	9

11. Psychomotor Skills

P	O	I	A	B	K	U	NU
a	--	--	--	--	--	--	--
b	1	2	91	94	94	94	93
k	--	--	--	--	--	--	--
d	--	--	--	--	--	--	--
T	1 (2%)	2 (1%)	91	94	94	94	93

12. Music Awareness

P	O	I	A	B	K	U	NU
a	--	--	--	--	--	--	--
b	1	2	92	93	95	93	93
k	--	--	--	--	--	--	--
d	--	--	--	--	--	--	--
T	1 (2%)	2 (1%)	92	93	95	93	93

Table 7

Summary of Proficiency and Instructional Sensitivity of Product Users on the Instructional Areas

Instructional Area	Number of Items		Product User Groups A Avg.-All	B Avg.-All	K Avg.-All	Composites Avg.-All
1. Vocabulary	66	P	70-71	72-76	74-78	70-78
		S	(8%)	(29%)	(27%)	(21%)
2. Phonics	58	P	54-57	59-65	59-66	54-66
		S	(14%)	(52%)	(45%)	(37%)
3. Word Reading	45	P	30-32	38-49	41-50	30-50
		S	(11%)	(67%)	(58%)	(45%)
4. Sentence Reading	27	P	11-12	22-35	32-42	11-42
		S	(4%)	(74%)	(70%)	(49%)
5. Teacher Questions	17	P	67-68	69-75	67-73	67-75
		S	(18%)	(24%)	(47%)	(29%)
6. Letters	17	P	83-85	83-86	84-88	83-88
		S	(18%)	(24%)	(29%)	(24%)
7. Reading Questions	15	P	26-28	29-40	32-45	26-45
		S	(0%)	(87%)	(73%)	(53%)
8. Affective Behavior	14	P	74-74	73-71	73-74	71-74
		S	(0%)	(21%)	(21%)	(14%)
9. Writing	12	P	69-73	68-74	71-73	68-73
		S	(8%)	(25%)	(0%)	(11%)
10. Spelling	3	P	8-11	22-32	11-8	8-22
		S	(0%)	(33%)	(0%)	(11%)
11. Psychomotor	2	P	91-94	94-94	94-97	91-97
		S	(0%)	(0%)	(0%)	(0%)
12. Music Awareness	2	P	92-90	93-94	95-97	90-97
		S	(0%)	(0%)	(0%)	(0%)

P - average proficiency

S - percentage of items sensitive

APPENDIX A - Product Outcome Descriptions

A - Alpha Time

B - Beginning to Read, Write and Listen

K - Kindergarten Program

D - Distar I

A - ALPHA TIME (New Dimensions)

Outcome Number	Instructional Area	Common Items	Name	Description
1.	6	3	Overall Letter Skills	Identify letters in isolation and word contexts.
2.	1	9	Word Analysis/ Vocabulary	Identify colors, shapes, positions, sizes, and amounts.
3.	1	8	Word Analysis/ Language	Use appropriate vocabulary to answer questions about a picture or story, select a letter that is the first letter of the name of a pictured object, and name objects in a picture.
4.	--	--	Simple Recall Skills	Recall simple facts dealing with who, when, where, why, what, and how of a teacher read story.
5.	1	3	Sequence	Identify the correct sequence of ordered events following a teacher read story.
6.	5	1	Main Idea	Identify the best title of a teacher read story.
7.	5	3	Prediction and Inference	Explain a logical inference drawn from a picture, provide logical consequences of an incomplete story, and supply the rhyming word that completes a poem.
8.	8	3	Reading and Literature	Demonstrate personal pleasure, appreciation, and interest in literature; demonstrate care for books; and use books for specific purposes.
9.	5	1	Interpretive Skills	Interpret the moods or feelings of characters in story situations.

Outcome Number	Instructional Area	Common Items	Name	Description
10.	1	1	Following Directions	Follow simple directions.
11.	8	2	Dramatic Play	Give dramatic expressions to pantomime, and dramatize lines or words so that the audience can identify the mood, emotion, or story being conveyed.
12.	6	3	Visual Memory	Identify the letter of the alphabet when presented with the letter name or a word beginning with the specified letter.
13.	2	6	Auditory Memory	Identify letter sounds in simple words.
14.	9	6	Psychomotor Skills	Write the letters of the alphabet in upper and lower case when presented with an example of the letter or the name of the letter.
15.	8	2	The Need to Belong	Participate in group activities and interact comfortably with new people.
16.	8	2	The Need to Achieve	Achieve personal goals and complete assigned tasks independently.
17.	8	1	The Need for Love and Affection	Accept affection from others.
18.	8	1	The Need to be Free from Guilt	Recognize that mistakes are to be expected.
19.	8	1	The Need for Self Respect	Express opinions freely to the teacher or classmates.
20.	8	1	The Need to be Free from Fear	Share feelings with classmates.
21.	8	1	The Need for Understanding	Listen attentively.

B - BEGINNING TO READ, WRITE AND LISTEN (Lippincott)

Outcome Number	Instructional Areas	Common Items	Name	Description
1.	--	--	Colors	Identifying basic colors and those produced by their mixture.
2.	1	2	Shapes	Identifying the shape of objects.
3.	--	--	Amounts	Identifying objects that differ in amount.
4.	1	1	Position	Identifying the position of objects.
5.	--	--	Visual Discrimination	Distinguishing between familiar objects including letters and words.
6.	6	5	Alphabet	Identifying upper and lower case letters of the alphabet.
7.	2	6	Letter/Sounds	Associating approriate sounds with the letter symbol.
8.	1	3	Synonyms	Identifying synonyms for words.
9.	2	6	Blending	Putting together letter sounds to form words.
10.	3	3	Word Recognition (Memory Words)	Recognizing words introduced in the program that are not blended.
11.	1	6	Vo-abulary	Understanding the meaning of common words.
12.	1	3	Inference	Completing a phrase or sentence with a logical word.
13.	1	1	Parts of Speech	Identifying verbs and adjectives.
14.	1	3	Rhyming	Identifying and forming rhyming words.
15.	2	1	Vowel/Consonants	Distinguishing vowels and consonants.

Outcome Number	Instructional Areas	Common Items	Name	Description
16.	9	3	Writing	Forming the upper and lower case letters, either singularly or in words.
17.	1	1	Punctuation	Distinguishing punctuation marks.
18.	--	--	Syllables	Dividing a word into syllables.
19.	10	3	Spelling	Understanding the meaning of common words.
20.	5	2	Picture Interpretation	Interpreting the meaning of pictures.
21.	1	1	Classification	Classifying common objects according to specific dimensions such as sweet-sour.
22.	5	3	Story Interpretation	Interpreting the meaning of a story.
23.	1	3	Sequence	Properly ordering a specific set of objects, experiences, etc.
24.	5	6	Comprehension	Answering specific questions about a teacher read story.
25.	3	9	Word Attack	Reading words composed of already learned word elements or letter sounds.
26.	4	9	Sentence Reading	Reading sentences of already learned words.
27.	11	2	Manual Dexterity	Demonstrating manual dexterity in simple tasks.
28.	12	2	Music Awareness	Reacting to musical instruments and to the music made by them.
29.	5	1	Oral Language Experience	Telling a short story about an experience.

K- KINDERGARTEN PROGRAM (Ginn and Company)

Outcome Number	Instructional Areas	Common Items	Name	Description
1.	1	3	Colors	Select and name examples of the concept, color
2.	1	3	Sizes	Select and name examples of the concept, size.
3.	1	3	Amounts	Select and name examples of the concept, amount.
4.	1	3	Shapes	Select and name examples of the concept, shape.
5.	1	3	Positions	Select and name examples of the concept, position.
6.	1	3	Pre-Math	Select and name examples in the area of pre-mathematics (e.g., equal, different).
7.	1	3	Pre-Reading	Select and name examples in the area of pre-reading (e.g., first [in time], after [in time], letter, sound).
8.	3	15	Words	Identify program words.
9.	2	6	Word Elements	Identify the sound of program elements.
10.	4	12	Sentences	Read aloud each word in sentences composed of program words.
11.	6	6	Letter Names	Identify the letters of the alphabet.

D - DISTAR I READING (Science Research Associates)

Outcome Number	Instructional Areas	Common Items	Name	Description
1.	2	12	Symbol--Action Games	Identify and repeat pictured or teacher presented sequences of bodily movements.
2.	--	--	Blending--Say It Fast	Say a word at a normal speaking rate when it is presented slowly with pauses between the parts.
3.	2	6	Rhyming	Make up words that rhyme with a given word by substituting new initial sounds.
4.	2	9	Blending--Spelling by Sounds	Spell a word by sounds (say one sound at a time), without pausing between the sounds, when the teacher says a word at a normal speaking rate.
5.	9	3	Writing	Write a symbol, word, phrase, or sentence by tracing the dotted lines when given a printed sample or write one freehand that was previously traced.
6.	2	6	Sound Recognition	Say the sound represented by a symbol when given a printed symbol.
7.	3	12	Word Recognition	Read aloud either a word composed of previously taught sounds or a common word that does not have a regular spelling.
8.	3	6	Word-Attack Skills	Read words that have double consonants; initial or final consonant combinations, or common endings; and read a series of words ending in rhyming patterns.
9.	7	9	Reading Stories	Read stories of increasing length and complexity both with and without typographical aides.

Outcome Number	Instructional Areas	Common Items	Name	Description
10.	4	6	Answering Questions	Make an independent written response when given an oral direction based on skills previously taught.
11.	7	6	Comprehension	Answer questions from the teacher that demonstrate reading understanding.

APPENDIX B - Statistics on Common Items by Instructional Area, Product Referenced and Product-User Group

Explanation of Entries in Appendix B Using Two Illustrative Items

Item Description			User Groups								
			Alpha Time			Beginning			Kindergarten		
Example	Items	Product Reference	P	I	C	P	I	C	P	I	C
1	IS	(08) K 23	29	1	6	49	17	2	71	23	1
2	FAT	(11) B 27	24	10	6	33	21	3	39	41	3

Legend

Product Reference-Item number is given in parentheses, the letter refers to one of the four products (A - Alpha Time, B - Beginning, D - Distar, K - Kindergarten) and the number indicates the product outcome referenced.

P - average item difficulty across classes in the user group

I - commonality estimate-percent of shared variance between class implementation and proficiency variables (see Figure 3)

C - item classification category (1 to 6, see Figure 2)

PRACTICE

ITEM #	DESCRIPTION	CHANCE	ALPHA USERS PR	LE	EN	R2	CLASS	BEGIN USERS PR	LE	EN	R2	CLASS	SMRL USERS PR	LE	EN	R2	CLASS
A38	ISLETTER AT START OF WORD	314	25	69	1	6	8	5	73	5	1	8	4	69	2	18	22	5
A39	ISLETTER AT START OF WORD	214	25	41	0	9	10	5	54	24	0	24	2	39	0	24	24	6
A40	ISLETTER AT START OF WORD	214	25	68	0	21	22	5	73	1	11	22	4	65	23	24	73	2
A41	ISLETTER AT START OF WORD	114	25	44	5	0	5	5	61	24	12	43	2	54	6	0	6	5
A42	ISLETTER AT START OF WORD	114	25	33	0	0	1	6	51	19	5	19	2	35	16	0	15	3
A43	ISLETTER AT START OF WORD	114	25	65	0	7	7	4	87	21	0	21	1	65	0	3	3	4
B9	07AAA	114	25	42	0	0	0	5	49	17	3	22	2	43	1	0	1	5
B10	07EEE	114	25	74	7	18	22	4	64	8	5	14	4	81	2	2	4	4
B11	07RRR	214	25	67	9	24	35	5	73	7	6	20	4	79	1	24	27	4
B12	07BBB	214	25	46	12	0	13	2	55	16	8	24	2	51	0	14	15	5
B13	07LLL	314	25	55	19	16	31	2	64	11	1	14	2	70	27	14	51	1
B14	07222	314	25	77	5	16	18	4	64	4	13	20	4	63	4	0	4	4
B18	09AA	114	25	40	3	0	3	5	46	27	2	32	2	49	21	2	25	2
B19	09AE	114	25	46	2	1	3	5	52	15	4	21	2	55	20	0	21	2
B20	09AT	214	25	35	7	11	20	6	72	5	4	12	4	53	18	26	41	2
B21	09AA	214	25	40	9	19	30	5	50	3	7	13	5	49	6	0	6	5
B22	09FU	314	25	25	6	22	26	6	45	25	0	26	2	37	0	19	20	6
B23	09AA	314	25	48	12	16	23	2	53	15	4	23	2	59	0	20	20	5
E40	15APX WORDS IN -BASKET-	318	0	18	5	12	18	5	15	20	0	22	2	8	18	4	21	3
S37	09AAA	114	25	59	1	25	42	5	74	2	9	18	4	66	19	6	31	2
S38	09LL	114	25	45	1	16	17	5	68	25	0	26	2	69	36	9	46	2
S39	09AO	214	25	51	4	14	20	5	53	9	5	15	5	68	27	12	47	2
S40	09AT	214	25	46	0	26	29	5	57	0	44	49	5	69	21	9	37	2
S41	09FF	114	25	69	0	8	8	5	62	71	0	76	2	71	23	2	29	1
S42	09AA	314	25	46	4	1	5	5	54	13	0	14	2	65	6	6	15	5
D1	01SAY IT FAST-PLAYING	120	0	51	6	1	2	4	76	10	5	16	1	69	11	25	33	1
D2	01SAY IT FAST-TELEPHONE	120	0	66	2	1	6	4	60	15	8	27	1	86	6	4	9	4
D3	01SAY IT FAST-BED	220	0	81	0	9	11	4	82	17	3	20	1	87	24	18	42	1
D4	01SAY IT FAST-HEN	120	0	58	3	1	6	4	59	8	1	10	4	69	0	6	7	4
D5	01SAY IT FAST-SNOWMAN	220	0	77	2	2	4	4	79	9	6	15	4	63	0	14	15	4
D6	01SAY IT FAST-SKELETON	120	0	75	3	0	4	4	66	5	14	22	4	75	9	10	18	4
D7	01SAY IT FAST-EATING	220	0	63	15	7	30	1	77	9	3	12	4	79	0	18	18	4
D8	01SAY IT FAST-MOTOCYCLE	220	0	85	5	7	17	4	82	21	9	30	1	86	12	36	49	1
D9	01SAY IT FAST-FISHING	320	0	92	0	12	13	4	87	14	0	14	1	86	2	1	5	4
D10	01SAY IT FAST-BUTTERFLY	320	0	94	11	14	23	1	90	6	0	6	4	91	1	0	2	4
D11	01SAY IT FAST-HONEY	320	0	88	5	5	9	4	96	5	1	6	4	91	0	15	17	4
D12	01SAY IT FAST-LEATHER	320	0	77	11	4	14	1	73	1	0	1	4	75	0	21	24	4
D13	03RHYMING-SISTER/MIS	114	25	23	8	1	15	6	26	0	27	26	6	21	2	3	7	6
D14	03RHYMING-HOT—PPP	114	25	35	6	12	32	6	36	12	0	12	3	33	0	14	16	6
D15	03RHYMING-MOTHER—BRR	214	25	31	3	5	12	6	31	4	2	6	6	35	21	0	21	3
D16	03RHYMING-PUT—HHH	214	25	36	1	3	7	6	37	26	0	35	3	34	23	2	25	3
D17	03RHYMING-EATING—NNN	314	25	44	1	9	10	5	35	30	4	36	3	44	13	6	26	2
D18	03RHYMING-SUN—RRR	314	25	49	0	3	3	5	49	6	0	6	5	59	16	10	35	2
D19	04SPELLING BY SOUND-ZII FFF	120	0	41	0	0	0	5	41	22	3	27	2	32	39	1	42	2
D20	04SPELLING BY SOUND-HHHRRR	220	0	41	0	31	37	5	49	38	3	42	1	47	6	1	7	4
D21	04SPELLING BY SOUND-SSSOOOOK	120	0	37	4	0	4	5	39	15	1	16	2	20	26	0	27	2
D22	04SPELLING BY SOUND-EEENNNOOO	120	0	30	0	0	2	5	26	13	0	14	2	23	36	0	40	2
D23	04SPELLING BY SOUND-TOOOLLL	320	0	25	12	1	14	2	21	1	0	1	5	17	0	0	0	5
D24	04SPELLING BY SOUND-SAAPO	220	0	34	0	20	21	5	40	42	0	43	2	46	3	8	12	4
D25	04SPELLING BY SOUND-OOOLLLD	220	0	30	2	17	25	5	38	23	1	25	2	41	1	3	4	5
D26	04SPELLING BY SOUND-SSSIIIT	320	0	31	19	3	24	2	44	10	1	11	2	33	11	0	11	2
D27	04SPELLING BY SOUND-OOOPEENN	320	0	24	8	3	12	5	23	2	3	7	5	15	6	0	0	5

WORD READING

ITEM #	DESCRIPTION	ALPHA USERS CHOICE	FR	LE	EN	RZ	CLASS	BEGIN USERS PR	LE	EN	RZ	CLASS	SAFL USERS PR	LE	EN	RZ	CLASS
B24	16HAD	114	25	55	0	2	2	5	54	6	4	12	5	69	36	2	39	2
B25	18SET	214	25	45	11	8	21	2	61	4	14	23	5	61	23	14	40	2
B26	18SAID	314	25	14	5	2	7	6	24	0	3	3	6	33	11	12	29	3
B63	25FURFEET	320	0	3	2	26	29	6	19	26	4	37	2	4	6	4	4	6
B64	25WORK	320	0	3	3	24	24	6	23	18	6	26	2	5	6	0	0	6
B65	25ACROSS	320	0	3	4	22	23	6	20	5	1	9	5	5	0	0	0	6
B66	25STUFF	120	0	6	6	5	6	6	19	33	1	38	2	16	5	3	6	5
B67	25MUFFIN	120	0	6	2	9	15	6	20	41	1	44	2	21	7	3	12	5
B68	25BLEND	120	0	4	6	3	12	6	15	33	1	36	2	13	5	2	7	6
B69	25FUZZ	220	0	8	1	15	16	6	26	28	9	45	2	17	15	2	23	2
B70	25CRAB	220	0	4	8	14	22	6	24	30	9	46	2	9	5	0	10	6
B71	25WHOS	220	0	6	1	15	15	6	44	18	7	31	2	25	26	9	40	2
B22	08NEED	214	25	29	0	1	1	6	35	14	10	31	3	59	28	9	46	2
B23	08TS	114	25	25	1	0	1	6	49	17	1	22	2	71	23	5	32	1
B24	08THAT	314	25	39	3	0	4	6	46	5	2	16	5	70	29	1	31	1
B25	08FILL	314	25	31	6	6	9	6	34	3	7	17	6	53	15	0	16	2
B26	08WE	114	25	41	3	12	14	5	45	27	0	26	2	76	9	6	18	4
B27	08WHO	214	25	36	14	5	36	3	38	3	4	5	6	46	38	3	46	2
B28	08FISH	214	25	52	1	16	16	5	42	26	0	26	2	64	33	20	66	2
B29	08LET	114	25	60	0	47	49	5	57	16	2	22	2	69	21	5	36	2
B30	08SHT	314	25	45	6	16	22	5	48	6	2	13	5	64	10	12	25	2
B31	08WITH	114	25	33	0	18	19	6	46	16	13	36	2	54	29	7	41	2
B32	08WILL	314	25	43	2	18	36	5	62	3	7	17	5	75	25	7	34	1
B33	08FEET	314	25	52	2	11	24	5	59	6	3	4	5	65	16	11	29	2
B34	08SAID	114	25	36	12	4	15	3	50	6	3	15	5	57	27	6	38	2
B35	08SEE	314	25	61	6	22	34	5	61	1	7	12	4	86	1	4	6	4
B36	08WEEK	114	25	40	0	20	20	5	36	17	11	36	3	58	30	6	42	2
D37	07WORD RECOGNITION-MATS	114	25	52	0	55	66	5	56	26	8	36	2	49	9	6	18	5
D38	07WORD RECOGNITION-HOP	114	25	38	9	31	66	6	50	13	5	20	2	41	6	8	16	5
D39	07WORD RECOGNITION-STONE	114	25	20	6	10	11	6	30	36	6	46	3	27	16	1	17	3
D40	07WORD RECOGNITION-SHOVE	114	25	36	6	3	17	6	40	7	3	10	5	33	7	11	21	6
D41	07WORD RECOGNITION-ROTE	214	25	30	1	10	10	6	34	11	2	14	3	27	9	2	11	6
D42	07WORD RECOGNITION-WRECKS	214	25	30	0	30	33	6	39	43	14	56	3	37	6	4	11	6
D43	07WORD RECOGNITION-CHICK	214	25	36	0	12	15	6	43	41	13	54	2	51	41	9	51	2
D44	07WORD RECOGNITION-DAMP	214	25	51	0	19	19	5	46	18	42	60	2	54	16	33	49	2
D45	07WORD RECOGNITION-RAIN	314	25	59	5	0	6	5	52	6	2	8	5	65	19	14	45	2
D46	07WORD RECOGNITION-SHOCKS	314	25	54	0	0	0	5	52	19	9	26	2	57	7	26	44	5
D47	07WORD RECOGNITION-HIDE	314	25	54	14	0	14	2	51	25	3	27	2	56	26	15	54	2
D48	07WORD RECOGNITION-MILE	314	25	44	5	2	8	5	46	22	6	29	2	51	2	14	22	5
D49	08WORD ATTACK-SATH	120	0	6	1	0	4	6	9	6	1	7	6	17	11	4	18	2
D50	08WORD ATTACK-JARM	120	0	9	5	3	13	6	9	23	6	24	3	14	16	0	19	3
D51	08WORD ATTACK-HICH	220	0	8	1	27	27	6	15	16	9	25	2	11	6	1	1	6
D52	08WORD ATTACK-BET	220	0	7	0	32	34	6	16	22	0	23	3	9	4	7	7	6
D53	08WORD ATTACK-WALD	320	0	8	16	9	26	3	20	18	13	29	2	12	11	17	36	3
D54	08WORD ATTACK-WORK	320	0	6	5	13	25	6	9	19	7	24	3	5	4	0	4	6

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SENTENCE READING

ITEM #	DESCRIPTION	CHANCE	ALPHA USERS PR	LE	EN	R2	CLASS	BEGIN USERS PR	LE	EN	R2	CLASS	SURL USERS PR	LE	EN	R2	CLASS
B72	26THE DOLL WILL MEND THE	120	0 2	6	34	34	6	17	31	6	33	2	6	16	2	13	3
B73	26THE CLOCK WILL BUZZ SOO	120	0 3	0	36	37	6	13	22	0	22	3	6	7	4	12	6
B74	26THE EGG IS HOT	120	0 7	6	17	18	6	32	43	4	50	2	11	23	2	27	3
B75	26THE GUN STICKS TO THE	320	0 2	1	21	21	6	13	18	10	34	3	3	0	16	16	6
B76	26RED TUGS THE BIG BAG	320	0 2	0	18	18	6	26	34	2	40	2	4	0	7	9	6
B77	26THE DOG IS LOST	320	0 5	0	19	19	6	36	20	2	26	2	7	0	10	10	6
B78	26TED PUT JAM ON THE HOT	220	0 3	11	5	20	3	12	36	5	51	3	13	7	4	12	6
B79	26ED SLEDS OFF THE CLIFF	220	0 2	6	0	8	6	26	19	5	30	2	11	6	0	6	6
B80	26IT IS A PUPPET	220	0 5	5	8	17	6	15	28	7	43	2	16	14	2	16	2
B43	10WILL THE BAD MEN SEE HIM	120	0 7	1	15	30	6	(	(	(	(	6	24	23	0	26	2
B44	10I AM SIS	320	0 7	0	6	7	6	28	61	3	61	2	80	9	8	18	4
B45	10SAM IS IN HIS BED	320	0 5	2	4	7	6	24	38	0	41	2	23	30	3	35	2
B46	10I AM MIT	220	0 11	0	33	34	6	26	24	11	44	2	76	16	1	23	1
B47	10MIT SEES IT	120	0 9	2	12	26	6	13	0	2	2	6	73	11	10	25	1
B48	10WILL BILL FIT IN THIS NEST	320	0 4	6	6	14	6	15	32	0	32	2	25	36	2	42	2
B49	10I WILL SIT IN THAT	220	0 6	0	36	43	6	10	6	6	8	6	51	20	6	33	1
B50	10MAT FILL THIS WITH MUD	220	0 5	6	8	11	6	7	0	1	1	6	27	26	5	36	2
B51	10SAM IS MAD AT MAT	120	0 7	1	42	46	6	24	41	4	53	2	54	17	7	28	1
B52	10MIT IS IN HIS BED	220	0 5	0	36	40	6	22	35	5	48	2	21	19	4	28	2
B53	10A MESS FELL ON SID	320	0 4	3	4	8	6	25	50	3	50	2	47	36	4	35	1
B54	10WILL I SEE THE BAD MEN	220	0 5	0	31	33	6	16	36	1	43	2	25	22	8	36	2
B64	10ANSWER QUESTIONS-BEST PICTURE	113	33 32	0	0	1	6	36	12	6	17	3	45	15	0	15	3
B65	10ANSWER QUESTIONS-BEST PICTURE	113	33 31	0	4	8	6	33	9	0	10	6	40	11	3	12	3
B66	10ANSWER QUESTIONS-BEST PICTURE	213	33 29	0	0	0	6	36	6	1	7	6	36	14	0	14	3
B67	10ANSWER QUESTIONS-BEST PICTURE	213	33 28	2	0	4	6	34	6	0	6	6	33	37	0	37	3
B68	10ANSWER QUESTIONS-BEST PICTURE	313	33 29	0	4	4	6	36	13	0	13	3	37	12	0	14	2
B69	10ANSWER QUESTIONS-BEST PICTURE	313	33 26	0	2	2	6	30	16	0	16	3	37	3	1	4	6

GIRL QUESTIONS

ITEM #	DESCRIPTION	CHANCE	ALPHA USERS PR	LE	EN	R2	CLASS	BEGIN USERS PR	LE	EN	R2	CLASS	SURL USERS PR	LE	EN	R2	CLASS
A24	06PICK BEST TITLE	720	0 39	0	6	7	5	51	10	3	10	1	46	17	0	20	1
A25	07WHY IS GIRL CRYING	720	0 65	0	8	9	4	71	11	0	11	1	69	2	15	17	4
A26	07WHAT HAPPENED	720	0 70	1	3	6	4	66	0	2	3	4	75	0	4	4	4
A27	07COMPLETE POEM	720	0 66	3	7	12	4	66	4	1	4	4	62	0	2	2	4
A31	09HOW DID MOM FEEL	720	0 91	0	12	14	4	87	0	2	2	4	93	2	4	6	4
B46	20SUN	113	33 43	7	3	6	6	46	12	15	26	2	47	24	0	25	3
B49	20TAG	313	33 21	0	21	23	6	41	0	1	0	6	28	0	6	6	6
B51	22HOW CROW FELT	113	33 65	1	22	22	4	80	5	14	21	4	64	16	2	19	1
B52	22HOW LITTLE RED R HOOD FELT	213	33 38	11	5	17	3	38	0	3	3	6	32	0	6	15	6
B53	22HOW GIRL FELT	313	33 86	0	1	2	4	90	1	2	2	4	87	14	11	31	1

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AFFECTIVE BEHAVIOR

ITEM #	DESCRIPTION	CHANCE	ALPHA USERS PR	LE	EN	R2	CLASS	BEGIN USERS PR	LE	EN	R2	CLASS	EARL USERS PR	LE	EN	R2	CLASS
A28	08USE MATERIALS	739	0	68	3	1	6	4	61	0	0	0	4	67	10	1	10	1
A29	08TAKES CARE OF BOOKS	739	0	88	1	6	9	4	86	16	5	26	1	86	4	1	5	4
A30	09SELECTES APPROPRIATE BOOKS	739	0	55	1	0	3	4	54	7	0	8	4	57	1	0	2	4
A33	11SHOW HOW PERSON LOOKED	720	0	90	1	10	13	4	90	22	1	23	1	89	3	5	8	4
A34	11ACT OUT ROLE	739	0	55	0	3	5	4	54	3	0	5	4	55	0	5	9	4
A35	15GOING IN	739	0	89	4	5	12	4	82	1	9	18	4	62	33	0	44	1
A36	15INTERACTS	739	0	66	2	1	4	4	67	0	21	29	4	71	21	1	29	1
A37	16ACHIEVES	739	0	71	0	2	3	4	71	1	9	10	4	69	0	5	6	4
A38	16COMPLETES TASKS	739	0	74	0	6	7	4	76	7	14	26	4	76	1	2	5	4
A39	17ACCEPTS AFFECTION	739	0	85	1	0	1	4	89	2	3	6	4	85	1	1	3	4
A40	18FREE FROM GUILT	739	0	80	0	2	4	4	61	25	3	33	1	74	5	4	9	4
A41	18EXPRESSES SELF	739	0	66	1	0	1	4	71	6	0	6	4	67	4	6	11	4
A42	20SHARES FEELINGS	739	0	70	1	0	3	4	66	3	1	9	4	75	7	7	21	4
A43	21LISTENS WHEN OTHERS SPEAK	739	0	73	0	9	11	4	88	0	0	0	4	70	0	0	1	4

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WRITING

ITEM # DESCRIPTION	CHANCE	ALPHA USERS PR	LE	EN	R2	CLASS	BEGIN USERS PR	LE	EN	R2	CLASS	BASIL USERS PR	LE	EN	R2	CLASS
A44 14COPY LETTER L	210	0 92	0	4	4	4	95	0	0	1	4	92	2	0	3	4
A45 14COPY LETTER D	210	0 93	3	5	6	4	87	0	5	7	4	90	5	6	8	4
A46 14WRITE LETTER U	210	0 78	0	7	10	4	67	18	6	16	1	68	8	4	5	4
A47 14WRITE LETTER P	110	0 55	2	5	7	4	60	3	7	12	4	67	0	10	10	4
A48 14COPY LETTER B	310	0 86	0	27	27	4	93	20	16	47	1	91	6	12	17	4
A49 14WRITE LETTER S	310	0 65	3	11	15	4	72	2	4	4	4	71	1	6	10	4
B41 16R (LOWER CASE)	110	0 27	0	0	0	5	36	19	6	30	2	30	5	2	8	5
B42 16U	210	0 71	14	1	14	1	62	4	14	23	4	68	2	0	2	4
B43 16K	310	0 69	4	26	27	4	63	1	1	3	4	73	3	0	3	4
D28 (5WRITING-I HAVE FUN	110	0 75	0	9	14	4	68	4	33	40	4	65	0	16	16	4
D29 (5WRITING-SHE IS COLD	210	0 50	6	8	8	4	52	1	7	9	4	62	2	5	7	4
D30 (5WRITING-HE ATE OATS	310	0 72	1	1	3	4	71	0	5	5	4	70	14	12	36	1

SPELLING

ITEM # DESCRIPTION	CHANCE	ALPHA USERS PR	LE	EN	R2	CLASS	BEGIN USERS PR	LE	EN	R2	CLASS	BASIL USERS PR	LE	EN	R2	CLASS
B45 19SOCK	118	0 5	3	9	14	6	19	18	0	20	2	8	6	9	9	6
B46 19CAKE IN	218	0 6	0	3	5	6	18	9	3	15	5	8	2	5	6	6
B47 19FIST	318	0 12	1	10	13	6	28	9	2	14	5	16	6	0	7	5

PSYCHOMOTOR BEHAVIOR

ITEM # DESCRIPTION	CHANCE	ALPHA USERS PR	LE	EN	R2	CLASS	BEGIN USERS PR	LE	EN	R2	CLASS	BASIL USERS PR	LE	EN	R2	CLASS
B61 27COLORING	739	0 93	0	4	5	4	96	1	0	1	4	95	2	0	2	4
B62 27CUTTING	739	0 89	0	0	0	4	92	0	1	1	4	93	1	2	4	4

MUSIC AWARENESS

ITEM # DESCRIPTION	CHANCE	ALPHA USERS PR	LE	EN	R2	CLASS	BEGIN USERS PR	LE	EN	R2	CLASS	BASIL USERS PR	LE	EN	R2	CLASS
B63 28INSTRUMENTS	739	0 84	1	2	4	4	96	0	1	1	4	86	2	0	2	4
B64 28REACTION	739	0 89	2	1	4	4	92	0	0	0	4	93	5	0	5	4

LETTERS

ITEM #	DESCRIPTION	CHANCE	ALPHA USERS PR	LE	EN	R2	CLASS	BEGIN USERS PR	LE	EN	R2	CLASS	EARL USERS PR	LE	EN	R2	CLASS
A1	01LETTERS IN -WWF-	118	0	73	0	1	1	4	73	0	17	23	4	66	7	15	34	4
A2	01LETTERS IN -GOG-	218	0	73	0	0	0	4	81	22	1	27	1	86	4	1	7	4
A3	01LETTERS IN -LEG-	318	0	76	1	0	1	4	71	4	0	5	4	81	0	0	1	4
A35	12WWW LETTER O	314	25	94	1	17	19	4	95	1	3	4	4	93	5	5	12	4
A36	12WWW LETTER W	214	25	93	0	6	7	4	95	0	13	13	4	96	0	3	3	4
A37	12WWW LETTER A	114	25	94	0	2	2	4	91	2	0	5	4	91	0	3	3	4
B4	03G (LOWER CASE)	114	25	90	6	3	8	4	93	3	9	13	4	86	19	0	19	1
B5	06W (LOWER CASE)	114	25	86	2	0	3	4	81	11	0	12	1	81	17	0	18	1
B6	07F (LOWER CASE)	214	25	72	15	10	21	1	80	3	6	12	4	75	13	0	14	1
B7	08J (CAPITAL)	314	25	63	6	9	13	4	86	1	16	19	4	81	4	0	4	4
B8	09U (LOWER CASE)	314	25	81	27	24	55	1	83	1	4	7	4	81	1	15	17	4
B35	11K	114	25	87	11	37	45	1	82	12	4	20	1	89	7	3	12	4
B36	11H	314	25	86	0	3	3	4	82	3	2	7	4	84	1	10	12	4
B37	11H	314	25	81	1	32	33	4	63	11	35	56	2	77	2	13	17	4
B38	11L	214	25	76	1	25	45	4	76	4	6	18	4	80	16	11	34	1
B39	11C	214	25	82	3	14	16	4	86	0	3	5	4	80	21	3	28	1
B40	11U	214	25	87	4	19	48	4	83	0	32	33	4	89	6	4	14	4

READING QUESTIONS

ITEM #	DESCRIPTION	CHANCE	ALPHA USERS PR	LE	EN	R2	CLASS	BEGIN USERS PR	LE	EN	R2	CLASS	EARL USERS PR	LE	EN	R2	CLASS
D55	09READING STORIES-BEST DESCRIPT	114	25	66	1	44	46	5	66	15	4	21	2	71	40	18	66	1
D56	09READING STORIES-BEST DESCRIPT	114	25	38	1	9	15	6	44	23	2	25	2	46	15	0	15	2
D57	09READING STORIES-BEST DESCRIPT	114	25	23	5	22	44	6	31	11	6	19	3	37	28	6	36	3
D58	09READING STORIES-BEST DESCRIPT	214	25	32	8	24	27	6	37	25	2	27	3	34	36	0	36	3
D59	09READING STORIES-BEST DESCRIPT	214	25	23	6	15	19	6	27	15	5	16	3	28	36	5	35	3
D60	09READING STORIES-BEST DESCRIPT	214	25	50	5	3	12	5	50	37	6	38	2	49	52	6	57	2
D61	09READING STORIES-BEST DESCRIPT	314	25	50	3	1	4	5	50	10	1	11	2	54	6	5	16	5
D62	09READING STORIES-BEST DESCRIPT	314	25	25	6	3	4	6	26	11	6	11	3	41	6	1	12	5
D63	09READING STORIES-BEST DESCRIPT	314	25	26	3	9	14	6	25	13	0	13	3	44	22	6	36	2
D70	11COMPREHEND-WHO WENT TO PARK	120	0	8	3	17	32	6	11	26	1	30	3	13	26	0	22	3
D71	11COMPREHEND-WHO AS FOX CHASING	120	0	10	4	19	37	6	13	14	0	16	3	15	23	3	29	2
D72	11COMPREHEND-WHAT WAS SHE HOLDING	220	0	11	0	0	1	6	13	7	0	8	6	16	18	0	10	2
D73	11COMPREHEND-WHAT DID THE HORSE	220	0	13	0	1	1	6	23	30	0	36	2	27	36	2	32	2
D74	11COMPREHEND-WHAT WILL BE MADE	320	0	4	1	6	9	6	7	16	0	16	3	6	6	1	1	6
D75	11COMPREHEND-WHAT DOES A LEAK MEAN	320	0	4	3	13	16	6	6	7	0	8	6	6	6	0	0	6

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WORD AND CONCEPTS MEANING

ITEM #	DESCRIPTION	ALPHA USERS CHANCE	PR	LE	EN	RJ	CLASS	BEGIN USERS PR	LE	EN	RJ	CLASS	BASIL USERS PR	LE	EN	RJ	CLASS
A4	ABOVE TOP OF	116	6	96	6	1	1	4	97	6	4	5	4	97	3	2	6	4
A5	ACCURATE	314	25	85	3	24	25	4	90	11	6	15	1	82	8	11	11	4
A6	ACTRIANGLE	114	25	94	6	0	1	4	91	1	2	6	4	92	8	2	2	4
A7	ADJACENT TO	214	25	94	6	0	6	4	90	6	4	26	4	95	4	1	4	4
A8	ADS	314	25	85	8	21	22	4	86	3	8	5	4	86	3	9	10	4
A9	ADSTRAIGHT	113	33	97	6	13	13	4	97	0	16	16	4	97	0	0	0	4
A10	ADYELLOW	214	25	97	1	3	7	4	96	1	9	11	4	97	3	2	6	4
A11	AGA	214	25	95	8	12	13	4	95	1	8	12	4	95	6	9	17	4
A12	AGRADENERTH	316	6	95	8	6	6	4	95	0	37	40	4	92	8	1	2	4
A13	ALEFT	720	6	60	6	4	4	4	62	6	9	22	4	66	6	1	2	4
A14	ASMALLER	720	6	97	0	7	7	4	96	0	15	16	4	96	13	2	15	1
A15	ATTACOTHBRUSH	314	25	97	1	2	4	4	97	1	0	1	4	97	10	0	11	1
A16	ATTICA CORRECT SUMMARY	720	0	99	2	1	3	4	97	16	23	34	1	98	21	2	22	1
A17	AUDIENCES	114	25	97	2	0	2	4	94	3	14	20	4	97	3	0	6	4
A18	AUDICYCLE	214	25	97	0	0	0	4	94	1	9	9	4	96	1	0	1	4
A19	AUTELL ALL ABOUT PICTURE	720	6	66	0	3	5	4	73	0	9	14	4	66	2	12	22	4
A20	AUTOMATIC STORY	720	6	53	0	7	6	4	64	1	1	2	4	66	26	16	46	1
A21	AUTOMATIC	114	25	64	6	12	12	5	59	2	5	6	5	76	5	6	5	4
A22	AUTRIST	214	25	83	6	2	3	4	86	7	4	15	4	85	6	5	5	4
A23	AUTWIRD	316	25	66	6	16	16	5	62	16	0	26	2	62	6	16	16	5
A24	AWFULLOWS DIRECTIONS	739	6	86	6	9	12	4	82	6	2	5	4	80	24	9	45	1
B1	BASEBALL	315	33	97	8	16	17	4	90	6	2	2	4	94	2	6	2	4
B2	BASTWILEST	715	33	95	6	24	24	4	92	0	9	16	4	95	9	3	15	4
B3	BASH TOP	316	6	96	3	15	17	4	97	6	1	1	4	96	19	19	24	1
B15	BEAUTIFULLY	114	25	32	6	2	3	6	42	11	11	24	2	39	24	2	25	3
B16	BETWEENNESSES	214	25	53	5	15	26	5	66	14	0	16	2	57	17	15	34	2
B17	BETWEENNESS	314	25	34	1	6	1	6	36	13	6	14	3	37	0	6	6	6
B27	BIRT	114	25	24	2	16	16	6	33	21	5	26	3	39	41	0	41	5
B28	BIRTH	114	25	26	6	5	5	6	32	13	8	24	3	40	16	0	16	2
B29	BIRT	214	25	36	0	7	7	6	38	14	4	25	2	32	24	11	34	2
B30	BLOW	214	25	19	3	0	3	6	37	14	6	23	3	32	8	9	21	6
B31	BOAT	314	25	36	7	11	20	6	41	16	6	27	2	39	17	6	17	3
B32	BOATS	314	25	26	4	2	5	6	41	14	5	22	2	36	3	7	15	6
B33	BOAT	114	25	27	9	6	9	6	36	19	6	19	3	32	7	0	8	6
B34	BOTH	114	25	46	21	13	29	2	43	8	0	16	3	38	26	6	26	3
B35	BOTTLE	314	25	33	2	1	5	6	37	6	0	0	6	40	2	3	6	5
B36	BOTTOM HOPE	314	25	21	6	12	12	6	26	3	1	5	6	24	6	7	16	6
B37	BOWTIE	114	25	51	12	2	15	5	44	16	5	22	2	42	9	1	12	5
B38	BOAT	214	25	24	1	1	2	6	36	13	4	22	3	36	17	2	21	3
B39	BOOT	314	25	15	7	0	7	6	28	0	0	16	6	26	6	4	5	6
B40	BRANCHTOP HOUSE	216	6	57	6	14	14	4	46	25	9	35	1	54	12	5	15	1
B41	BROWN	315	33	91	6	4	4	4	92	0	2	2	4	82	7	6	17	4
B34	BEFORE	113	33	47	6	26	26	6	41	0	21	22	6	53	15	11	26	2
B42	BEST	213	33	81	0	39	36	4	84	0	1	1	4	81	9	14	26	4
B45	BETTER	313	33	56	1	14	14	5	56	0	2	4	5	73	16	3	17	2
B1	BIRTH	213	33	97	4	1	4	4	96	2	0	2	4	97	1	3	4	4
B2	BLUE	313	33	95	2	6	2	4	95	2	46	46	4	95	0	9	10	4
B3	BIRTH	313	33	95	5	2	6	4	90	11	31	36	1	96	0	2	3	4
B4	BREAKFAST	313	33	67	3	3	6	4	85	4	4	7	4	96	0	10	10	4
B5	BROKEN	312	34	91	0	6	6	5	94	20	3	21	2	89	0	11	11	5
B6	BUDGET	112	56	84	3	36	40	5	84	6	22	24	5	87	0	0	0	5
B7	BUILT	113	33	96	3	1	6	5	66	6	1	1	5	72	8	6	9	5
B8	BUSES	212	56	71	9	37	44	5	66	4	3	9	6	81	0	7	9	5
B9	BUSY	312	56	89	1	1	4	5	86	6	15	16	5	93	0	9	10	5
B10	BUSSURE	313	33	94	6	21	26	4	96	6	0	2	4	96	6	12	12	4
B11	BUTTRIANGLE	213	33	82	16	0	16	1	88	14	2	15	1	93	4	2	6	4
B12	BUZZWIRE LINE	213	33	92	1	6	1	4	96	3	36	36	4	96	6	1	9	4
B13	BUZZ	213	33	66	0	22	22	4	89	0	66	61	4	93	0	10	12	4
B14	BRAKES	316	6	96	0	4	7	4	96	3	13	31	4	95	0	23	23	4
B15	BOATSIDE	112	56	97	16	4	24	1	96	0	11	13	4	96	6	0	1	4
B16	BULLET	213	26	66	15	4	16	2	54	6	24	25	5	56	0	1	1	5
B17	BRIGHT	315	26	91	4	19	19	5	55	6	17	23	5	57	6	7	7	5
B18	BRUST THE SAME	113	33	49	1	0	1	5	45	0	25	25	6	56	16	6	11	2
B19	BUFFER (IN TIME)	312	33	85	6	6	6	4	66	6	54	56	4	66	2	10	14	4
B20	BUFFIST (IN TIME)	113	33	71	1	43	46	5	72	9	0	11	5	61	9	6	16	4
B21	BULAST (IN TIME)	213	33	87	5	43	48	4	83	6	34	36	4	86	2	2	6	4